Geosyntec consultants

134 N LaSalle Street, Suite 300
Chicago, IL 60602
PH 312-658-0500
FAX 312-658-0576
www.geosyntec.com

2 April 2019

Ms. Nicole Wilson, P.E.
Project Manager
Federal Site Remediation Section
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, Illinois 62794-9276

Subject: Environmental Monitoring Report – 2018 Long-Term Groundwater Environmental Monitoring Evaluation Report
MIG/DeWane Landfill Site, Belvidere, Illinois

Dear Ms. Wilson:

On behalf of BFI Waste Systems of North America, Inc., Geosyntec Consultants is submitting the 2018 Long-Term Groundwater Environmental Monitoring Evaluation Report for the MIG/DeWane Landfill. Should you have any questions please contact me at (630) 203-3349.

Sincerely,

Jesse Varsho, P.E., P.G.
Principal Engineer

Attachments 2018 Long-Term Groundwater Environmental Monitoring Evaluation Report

Copies to: Eric Ballenger; BFINA (via email)
Mary Tierney; U.S. EPA (1 copy)
Andrew Schulkin; BFINA (via email)
Jay Timm; IEPA (2 copies)

Prepared for:

BFI Waste Systems North America, LLC
26 West 580 Schick Road, Hanover Park, Illinois 60133

2018 LONG-TERM GROUNDWATER ENVIRONMENTAL MONITORING EVALUATION REPORT

MIG/DEWANE LANDFILL SUPERFUND SITE BOONE COUNTY, BELVIDERE, ILLINOIS

0070050002- BOONE COUNTY
ILD 980497788

Prepared by

Geosyntec consultants

engineers | scientists | innovators

134 N. La Salle Street, Suite 300
Chicago, Illinois 60602

Project Number CHE8214

Revision No. 0: April 2019

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

COC	Contaminants of Concern
GMZ	Groundwater Management Zone
IAC	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
LGME	Long-term Groundwater Monitoring Event
MNA	Monitored Natural Attenuation
O&M	Operations and Maintenance
ROD	Record of Decision
USEPA	United States Environmental Protection Agency

1. INTRODUCTION

1.1 Terms of Reference

This 2018 Long-Term Groundwater Environmental Monitoring Report is submitted by BFI Waste Systems of North America, LLC. for the MIG/DeWane Landfill Superfund Site (Site) in Boone County, Illinois. This report summarizes the 2018 quarterly Long-Term Groundwater Monitoring Events (LGME), which were performed to meet the requirements of Section 7.5 of the 2000 Consent Decree-Statement of Work, and Sections 6.3 and 9.3 of the Operations and Maintenance Plan (O&M) Plan for the Site. The Environmental Monitoring Report was prepared by Geosyntec Consultants (Geosyntec) and reviewed by Jesse Varsho, P.E., P.G. of Geosyntec.

1.2 Purpose

The purpose of this Environmental Monitoring Report is to summarize the results of the four quarterly LGMEs completed in 2018 and provide natural attenuation evaluation for groundwater.

1.3 Site Background

The Site is located in Boone County, Illinois approximately 0.25 miles east of the City of Belvidere and 0.5 miles north of U.S Business Route 20. The Site is bounded on the north by the Chicago and Northwestern railroad tracks, and the Commonwealth Edison right-of-way. North of the railroad tracks is an agricultural field that extends to the Kishwaukee River. Agricultural property is located north and east of the Site and commercial properties are located to the south of the Site. A soil borrow pit and stormwater detention basin, used to provide soil for the Site's interim and final cap, is immediately adjacent to the west of the Site. Farther west of the Site is a residential housing development known as the Wycliffe Estates subdivision.

The Site occupies an area of approximately 47 acres and rises to a height of approximately 55 feet above the surrounding terrain. It operated as a landfill from 1969 until 1988. The landfill was a co-disposal facility where industrial wastes were disposed of with municipal solid wastes. The Site received residential, municipal, commercial, and industrial wastes. The Site was abandoned in 1988 by a former operator prior to achieving complete final closure. U.S. Environmental Production Agency (USEPA) placed the Site on the National Priorities List in 1990. Construction of the final remedial action occurred between 2014 and 2016 that consisted of placement of a final cover system, replacement of the leachate collection system, improvements to the landfill gas management system and environmental monitoring systems. The Illinois Environmental Protection Agency (IEPA) certified completion of the remedial action construction on March 8, 2017.

1.4 Overview of Groundwater Monitoring

The USEPA concluded in the Record of Decision (ROD) that natural attenuation was occurring and that Monitored Natural Attenuation (MNA) would be an ongoing component of the remedial action at the Site. The ROD also indicates that the potential for exposure to Contaminants of Concern (COCs) is via the surface water pathway in the Kishwaukee River. The ROD specifically identifies two primary groundwater migration pathways: the West Glacial Drift pathway which flows to the northwest and the North Interface pathway which flows to the North towards the Kishwaukee River.

The surface water pathway has been identified as the potential exposure route and institutional controls to prevent groundwater use at the Site have been made a part of the Site remedy. Consequently, groundwater action levels for the Site were established in the ROD to be protective of surface water. The groundwater action levels (North and West Pathways) were established through a mathematical comparison of concentrations of groundwater constituents at the boundary of the Site that undergo natural attenuation as they migrate toward the Kishwaukee River. Groundwater monitoring data will track changes in groundwater conditions along each pathway before reaching the Kishwaukee River.

1.4.1 Long-Term Groundwater Monitoring Program and Field Sampling Procedures

The long-term groundwater monitoring well system consists of 25 wells, which are listed in **Table 1-1** and shown in **Figure 1-1**. The first, second, third, and fourth quarterly LGMEs were performed in March 2018, June 2018, August 2018, and December 2018, respectively. In addition to collection of analytical samples, static groundwater level measurements were measured as described in the quarterly reports. Groundwater elevations measured during the 2018 fourth quarterly event are shown in **Figure 1-1**.

1.5 Long-Term Groundwater Monitoring Report Organization

The remaining sections of this Report are organized as follows:

- *Section 2, Quarterly Sampling and Trend Analysis,* provides a summary of recent monitoring results, comparison of groundwater data to Site action levels and performance standards, and historical trend analysis; and

- *Section 3, Groundwater Management Zone (GMZ),* provides an update to the establishment of the GMZ.

2. QUARTERLY SAMPLING AND TREND ANALYIS

2.1 Groundwater Elevation and Flow

Groundwater elevation data and potentiometric contour maps for the Glacial Drift and Bedrock Interface hydrostratigraphic units at the first to fourth quarterly events are presented in the quarterly reports. The potentiometric maps were developed during each quarter using static groundwater levels from selected monitoring wells in each hydrostratigraphic unit. Fourth quarter groundwater elevation data and potentiometric contour maps for the Glacial Drift and Bedrock Interface appear in **Table 2-1**, and **Figures 2-1a** and **2-1b**, respectively. The data indicate that groundwater elevations measured quarterly in 2018 were consistent throughout the year. Furthermore, the horizontal groundwater flow direction in the Glacial Drift hydrostratigraphic unit is north-northeast and the groundwater flow direction in the Bedrock Interface hydrostratigraphic unit is north-northeast, which was consistent across each quarter.

2.2 Comparison of Analytical Results to Site Action Limits

Action levels for groundwater at the Site are defined in the 2000 ROD and are pathway dependent. Action levels for detected COCs in the West and North Pathways are provided in **Table 3-1**. No COC concentrations in the twelve samples collected in the fourth quarter of 2018 exceeded Action Limits for the West Pathway or North Pathway.

2.3 Analytical Exceedances

Trend and natural attenuation analysis for parameters that exceeded its Illinois Administrative Code (IAC) 620 Class I Groundwater Standard during any quarter of 2018 are described in subsequent sections. Analytes detected in 2018 are reported in **Table 3-1.** Lists of all analytes tested for, lab reports and data validation reports are provided in the previously submitted quarterly reports..

2.3.1 Benzene

Concentrations of benzene in groundwater exceeded the IAC Part 620 Class I Groundwater Standard (5.0 micrograms per liter [µg/L]) only at well MW06S during three of the four 2018 LGMEs. As shown in **Table 3-1**, concentrations measured in 2018 range from 1.2 µg/L to 5.7 µg/L. The figure shows the benzene concentrations collected from July 2012 through 2018 have a general downward trend. Benzene was detected below the Class I Groundwater Standard at wells MW08S, MW15, and MW16/16R, and was non-detect at all other sampled wells during 2018**.**

2.3.2 1,4-Dioxane

In 2018, 1,4-dioxane was sampled on a quarterly basis, and was found to exceed the IAC Part 620 Class I Groundwater Standard (7.7 µg/L, applied in 2013) at wells MW02S, MW06S, MW08S, MW13, MW15, and MW16/16R, as shown in **Table 3-1**. Concentrations measured in 2018 range from 4 µg/L to 131 µg/L. 1,4-dioxane was detected below the Class I Groundwater Standard at wells MW03S, MW07S, and MW14, and was non-detect at all other sampled wells during 2018**.**

1,4-dioxane will return to annual sampling prior per the approved O&M plan. The proposed GMZ will extend beyond wells where 1,4-dioxane was detected above the Class I Groundwater Standard.

2.3.3 Total Arsenic

Concentration of total arsenic in groundwater exceeded the IAC Part 620 Class I Groundwater Standard (0.010 mg/L) in wells MW03S, MW06S, MW08S, MW13, MW14, MW15, and MW16/16R during more than one quarter in 2018, as shown in **Table 3-1.** Total arsenic concentrations ranged from 0.002 mg/L to 0.078 mg/L.

2.3.4 Total Barium

Concentrations of total barium in groundwater exceeded the IAC Part 620 Class I Groundwater Standard (2.0 mg/L) in only well MW06S during all four quarters in 2018. Barium was detected below the Class I Groundwater Standard in all other wells sampled in 2018. As shown in **Table 3-1,** total barium concentrations ranged from 0.036 mg/L to 2.41 mg/L in the wells sampled in 2018.

2.3.5 Total Boron

Concentrations of boron in groundwater exceeded the IAC Part 620 Class I Groundwater Standard (2.0 mg/L) in wells MW06S and MW15 during all four quarters in 2018. As shown in **Table 3-1**, total boron concentrations ranged from 0.06 mg/L to 5.15 mg/L in the wells sampled in 2018**.**

2.3.6 Total Chromium

Concentrations of total chromium in groundwater exceeded the IAC Part 620 Class I Groundwater Standard (0.1 mg/L) in well MW06D during the first quarter in 2018. As shown in **Table 3-1**, total chromium concentrations in 2018 ranged from 0.005 mg/L to 0.14 mg/L in the wells sampled in 2018.

2.3.7 Total Iron

Concentrations of total iron exceeded the IAC Part 620 Class I Groundwater Standard (5.0 mg/L) in wells MW08S, MW13, MW14, MW15, and MW16/16R during several quarters in 2018, as

shown in **Table 3-1**. Iron concentrations ranged from 0.05 mg/L to 25.1 mg/L. Maximum concentration of 25.1 mg/L was detected in well MW16.

2.3.8 Total Manganese

Concentrations of total manganese exceeded the IAC Part 620 Class I Groundwater Standard (0.15 mg/L) in wells MW02S, MW03S, MW06S, MW15, and MW16/16R during at least one quarter in 2018, as shown in **Table 3-1.** Manganese concentrations ranged from 0.02 mg/L to 0.674 mg/L. Maximum concentrations of 0.674 mg/L and 0.590 mg/L were detected in wells MW16/16R and MW03S, respectively.

2.3.9 Nickel

Concentrations of total nickel exceeded the IAC Part 620 Class I Groundwater Standard (0.10 mg/L) in wells MW03D, MW06D, MW06S, and MW15 during several quarters in 2018, as shown in **Table 3-1**. Nickel concentrations ranged from 0.006 mg/L to 0.372 mg/L, and the maximum concentration of 0.372 mg/L was detected in well MW15.

2.3.10 Total Chloride

Concentrations of total chloride exceeded the IAC Part 620 Class I Groundwater Standard (200.0 mg/L) at wells MW06S, MW07S, MW13, MW 15, and MW16/16R during at least one quarter in 2018, as shown in **Table 3-1**. Chloride concentrations ranged from 5 mg/L to 1530 mg/L, and the maximum concentration of 1,530 mg/L was detected in well MW15.

3. GROUNDWATER MANAGEMENT ZONE ESTABLISHMENT

Groundwater is considered within the GMZ if any parameter is above the IAC Part 620 Class I Groundwater Standard. The proposed GMZ boundaries lie beyond wells where exceedances of a Class I Groundwater Standard were detected in groundwater in 2018. At this time, the facility is not proposing to change the proposed GMZ boundary based on the 2018 groundwater sample results. The facility is working to gain approval of institutional controls by the property owner of the agricultural field north of the site (Mickey property) and then will submit a GMZ application to the IEPA.

4. SUMMARY

Groundwater elevations and flow directions measured during the four LGMEs are consistent with historical measurements. Based on the four quarterly 2018 LGME results, there were no parameters that exceeded the established groundwater action limits as discussed in Section 6.5 of the O&M Plan. Groundwater analytical results are generally consistent with historical results. Decreasing concentration trends for many parameters at several wells indicate that MNA continues to be the appropriate remedial action for the Site. The facility will continue to work with the adjacent landowner to secure permission for the GMZ and submit an GMZ application to the IEPA.

TABLES

Table 1-1. Long-Term Groundwater Monitoring Wells
MIG/DeWane Landfill Superfund Site
Boone County, Illinois

Well ID	Hydrogeologic Unit	Relative Location	Northing	Easting	Ground Surface Elevation	Top of Casing Elevation	Depth of Well (ft)
MW02D	North Interface	Upgradient	2034445.05	855707.36	784.82	787.13	37.0
MW02S	West Glacial Drift	Upgradient	2034440.16	855703.27	785.06	786.88	15.5
MW03D	North Interface	West Site Boundary	2035761.07	854426.19	810.99	813.59	79.6
MW03S	West Glacial Drift	West Site Boundary	2035766.59	854425.69	811.32	813.90	40.0
MW04D	North Interface	Side-Gradient	2035800.37	856708.24	775.99	788.60	30.0
MW04S	West Glacial Drift	Side-Gradient	2035800.37	856739.80	776.24	788.80	10.5
MW05S	North Interface	Side-Gradient	2036437.51	856583.69	776.96	780.06	30.7
MW05D	North Interface	Side-Gradient	2036437.51	856550.14	777.26	779.94	51.0
MW06S	North Interface	Downgradient Site Boundary	2036827.31	855813.90	779.49	781.56	35.6
MW06D	North Interface	Downgradient Site Boundary	2036839.90	855856.39	779.49	782.14	54.6
MW07S	North Interface	Downgradient Site Boundary	2037104.51	855146.90	777.88	780.14	35.0
MW07D	North Interface	Downgradient Site Boundary	2037114.34	855189.89	778.03	779.85	55.0
MW08S	North Interface	Downgradient Site Boundary	2037231.61	854454.00	779.08	782.80	44.6
MW08D	North Interface	Downgradient Site Boundary	2037234.81	854535.35	779.03	781.15	65.0
MW09D	North Interface	Kishwukee River Sentinel Well	2037592.71	855868.00	771.74	774.16	61.0
MW09S	West Glacial Drift	Kishwukee River Sentinel Well	2037595.11	855860.10	771.60	773.91	31.0
MW10D	North Interface	North of Kishwaukee River(1)	2038471.58	855848.00	759.29	761.33	78.0
MW10S	West Glacial Drift	North of Kishwaukee River(1)	2038471.58	855881.15	759.35	762.20	16.7
MW11R	West Glacial Drift	Kishwukee River Sentinel Well	2037355.54	856220.64	768.33	770.84	18.9
MW12D	North Interface	Kishwukee River Sentinel Well	2038022.61	854822.40	758.70	761.21	77.0
MW12S	West Glacial Drift	Kishwukee River Sentinel Well	2038022.31	854816.60	758.70	761.41	14.9
MW13	West Glacial Drift	West Site Boundary	2036431.91	854348.90	793.30	795.68	21.8
MW14	West Glacial Drift	West Site Boundary	2036618.61	853965.50	797.96	797.98	30.9
MW15	NA	Downgradient Site Boundary	2036673.61	856091.10	781.00	783.11	23.2
MW16R	NA	Downgradient Site Boundary	2037015.31	855426.60	774.90	777.37	19.7

Notes:
Locations of monitoring wells are shown on Figure 2-1.
NA - Not applicable
(1) MW10S and MW10D are not hydraulically connected to the Site.

Table 2-1
4th Quarter 2018 Groundwater Levels
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Well ID	Date	Total Depth (feet bgs)	TOC Elevation (feet MSL)	Depth to Water (feet below TOC)	Groundwater Elevation (feet MSL)	4th Quarter 2018 Groundwater Sample Collected	Comment
MW02D	12/18/2018	37	787.13	NA	NA	No	Well Plugged(1)
MW02S	12/18/2018	15.5	786.88	2.30	784.58	Yes	
MW03D	12/18/2018	79.6	813.59	31.04	782.55	Yes	
MW03S	12/18/2018	40	813.90	30.81	783.09	Yes	
MW04D	12/18/2018	30	788.60	6.96	781.64	No	
MW04S	12/18/2018	10.5	788.80	5.38	783.42	No	
MW05D	12/18/2018	51	779.94	NA	NA	No	Well Plugged(2)
MW05S	12/18/2018	30.7	780.06	15.45	764.61	No	
MW06D	12/18/2018	54.6	782.14	17.70	764.44	Yes	
MW06S	12/18/2018	35.6	781.56	14.95	766.61	Yes	
MW07D	12/18/2018	55	779.85	NA	NA	No	Well Plugged(2)
MW07S	12/18/2018	35	780.14	14.84	765.30	Yes	
MW08D	12/18/2018	65	781.15	NA	NA	No	Well Plugged(2)
MW08S	12/18/2018	44.6	782.80	11.71	771.09	Yes	
MW09D	12/18/2018	61	774.16	19.64	754.52	No	
MW09S	12/18/2018	31	773.91	19.75	754.16	No	
MW10D	12/18/2018	78	761.33	4.65	756.68	No	
MW10S	12/18/2018	16.7	762.16	NA	NA	No	Well Plugged(2)
MW11R	12/18/2018	18.9	770.84	15.69	755.15	No	
MW12D	12/18/2018	77	761.21	4.60	756.61	No	
MW12S	12/18/2018	14.9	761.41	7.87	753.54	No	
MW13	12/18/2018	21.8	795.68	19.20	776.48	Yes	
MW14	12/18/2018	30.9	797.98	23.54	774.44	Yes	
MW15	12/18/2018	23.2	783.11	15.55	767.56	Yes	
MW16R	12/18/2018	19.7	777.37	11.55	765.82	Yes	

Notes:
TOC=Top of Casing
MSL=Mean Sea Level
bgs=below ground surface
NA = Not Available (Well Plugged)
(1) MW02D could not be sampled due to freezing conditions of the water table near the ground surface (plugged with ice).
(2) Wells will be further investigated during the 1st qtr. of 2019.

Table 3-1
2018 Long-Term Groundwater Monitoring Analytical Results
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Analyte	Quarterly and Annual Sampling (Y/N)	Units	West Pathway Action Level	North Pathway Action Level	IL Class I GW Standard	MW02D			MW02S				MW03D				MW03S			
						3/27/2018	6/21/2018	9/27/2018	3/27/2018	6/21/2018	9/27/2018	12/18/2018	3/27/2018	6/21/2018	9/26/2018	12/18/2018	3/27/2018	6/21/2018	9/26/2018	12/18/2018
VOCs																				
1,1-Dichloroethane	N	ug/L	NL	NL	1400	NM	NM	NM	NM	NM	NM	< 5.0	NM	NM	NM	< 5.0	NM	NM	NM	< 5.0
1,2-Dichloropropane	Y	ug/L	850	370	5	< 1.0 R	< 1.0 R	< 1.0	< 1.0 R	< 1.0 R	< 1.0	< 1.0	< 1.0 R	< 1.0 R	< 1.0	< 1.0	< 1.0 R	< 1.0 R	< 1.0	< 1.0
Benzene	Y	ug/L	6300	1370	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	Y	ug/L	NL	NL	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	Y	ug/L	10580	4770	2	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J
SVOCs																				
1,4-Dioxane	Y	ug/L	NL	NL	7.7	< 5	< 5	< 5	< 5	< 5	< 5	**9**	< 5	< 5	< 5	< 5	**5**	< 5	< 5	< 5
Inorganics - Metals																				
Arsenic	Y	mg/L	NL	NL	0.01	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J	**0.014**	**0.01**	**0.008 J**	**0.01**
Barium	Y	mg/L	NL	NL	2	**0.111**	**0.1**	**0.105**	**0.093**	**0.087**	**0.086**	**0.086**	**0.245**	**0.244**	**0.245**	**0.251**	**0.098**	**0.087**	**0.091**	**0.096**
Boron	Y	mg/L	NL	NL	2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	**0.08**	**0.07**	**0.11**	**0.06**
Chromium	Y	mg/L	NL	NL	0.1	< 0.005	< 0.005	< 0.005	**0.14**	**0.013**	**0.015**	< 0.005	**0.01**	< 0.005	< 0.005	**0.008**	< 0.005	< 0.005	< 0.005	< 0.005
Cobalt	N	mg/L	NL	NL	1	NM	NM	NM	NM	NM	NM	< 0.005	NM	NM	NM	< 0.005	NM	NM	NM	< 0.005
Iron	Y	mg/L	NL	NL	5	**0.08**	**0.08**	**0.05**	**3.31**	**0.2**	**0.11**	**0.07**	**2**	**2.46**	**1.9**	**2.03**	**3.04**	**2.53**	**2.5**	**2.55**
Manganese	Y	mg/L	NL	NL	0.15	**0.058**	**0.043**	**0.054**	**0.255**	**0.114**	**0.099**	**0.084**	**0.083**	**0.124**	**0.078**	**0.123**	**0.59**	**0.576**	**0.532**	**0.583**
Nickel	Y	mg/L	NL	NL	0.1	**0.01**	**0.006**	**0.006**	**0.016**	< 0.005	< 0.005	**0.006**	**0.125**	**0.201**	**0.13**	**0.343**	**0.01**	**0.009**	**0.01**	**0.008**
Zinc	N	mg/L	NL	NL	5	NM	NM	NM	NM	NM	NM	< 0.010	NM	NM	NM	**0.024**	NM	NM	NM	< 0.010
Inorganics - Other																				
Chloride	Y	mg/L	NL	NL	200	**118**	**105**	**101**	**152**	**174**	**157**	**152**	**70 J+**	**35**	**71**	**73**	**46**	**51**	**67**	**49**
Methane	Y	ug/L	NL	NL	NS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0 N S	**7.7**	**7.2**	**7.1**	**7.7 N S**	**29.2**	**33.1**	**22.9**	**21.4 N S**
Nitrate (as N)	Y	mg/L	NL	NL	10.0	< 0.10 J	**0.11 J**	< 0.10	**0.58 J**	**1.22 J**	< 0.10	**1.47**	< 0.10 J	< 0.10 J	< 0.10 J	< 0.10	< 0.10 J	< 0.10 J	< 0.10	< 0.10
Sulfate	Y	mg/L	NL	NL	400	**59**	**54**	**55**	**48**	**53 J-**	**55**	**53 NN**	**71**	**70**	**74**	**59 NN**	**31**	**32**	**37**	**32 NN**

Notes:
(1) Detections are bold.
(2) No results exceeded the West or North Pathway Action Levels. Shaded cells indicate exceedance of the Illinois Class I Groundwater Standard.
(3) Only detected analytes are presented. Full lists of non-detected analytes are provided in respective quarterly reports.
(4) NM indicates that the parameter was not analyzed for during the specified sampling event.
(5) NL indicates that there is no North or West Pathwary Action Level whereas NS indicates that there is not Illinois Class I Groundwater Standard.
(6) A less than symbol indicates thte analyte was analyzed for, but was not detected above the reported sample quantation limit.
(7) A less than symbol and J indicates that the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.
(8) J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
(9) J+ indicates the analyte was positively identified; the associated numerical value is likely to be higher than the concentration of the analyte in the sample.
(10) J- indicates the analyte was positively identified; the associated numerical value is likely to be lower than the concentration of the analyte in the sample.
(11) N indicates that the analyte is not part of the laboratory's NELAC accreditation or accreditation may not be available for the analyte.
(12) R indicates that analyte analysis was rejected due to laboratory calibration outsite acceptance criteria. Refer to the 4th quarter report for additional details.
(13) S indicates that the analysis was subcontracted to another laboratory

Table 3-1
2018 Long-Term Groundwater Monitoring Analytical Results
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Analyte	Quarterly and Annual Sampling (Y/N)	Units	West Pathway Action Level	North Pathway Action Level	IL Class I GW Standard	MW06D				MW06S					MW07S				
						3/28/2018	6/21/2018	9/27/2018	12/17/2018	3/28/2018	3/28/18 DUP	6/20/2018	9/27/2018	12/17/2018	3/28/2018	6/20/2018	6/20/18 DUP	9/27/2018	12/17/2018
VOCs																			
1,1-Dichloroethane	N	ug/L	NL	NL	1400	NM	NM	NM	< 5.0	NM	NM	NM	NM	**9.4**	NM	NM	NM	NM	< 5.0
1,2-Dichloropropane	Y	ug/L	850	370	5	< 1.0 R	< 1.0 R	< 1.0	< 1.0	< 1.0 R	< 1.0 R	< 1.0 R	< 1.0	< 1.0	< 1.0 R	< 1.0 R	< 1.0 R	< 1.0	< 1.0
Benzene	Y	ug/L	6300	1370	5	< 1.0	< 1.0	< 1.0	< 1.0	**5.7**	**5.7**	**5**	**4.6**	**5**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	Y	ug/L	NL	NL	5	< 1.0	**1.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	Y	ug/L	10580	4770	2	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	**1.5 J**	**1.4 J**	**1.0 J**	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J
SVOCs																			
1,4-Dioxane	Y	ug/L	NL	NL	7.7	< 5	< 5	< 5	< 5	**61**	**67**	**57**	**48**	**59**	**7**	< 5	< 5	< 5	**5**
Inorganics - Metals																			
Arsenic	Y	mg/L	NL	NL	0.01	**0.002 J**	< 0.002 J	< 0.002 J	< 0.002 J	**0.009 J**	**0.010 J**	**0.01**	**0.008 J**	**0.011**	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J	< 0.002 J
Barium	Y	mg/L	NL	NL	2	**0.186**	**0.183**	**0.185**	**0.199**	**2.15**	**2.16**	**2.17**	**2.11**	**2.41**	**0.267**	**0.267**	**0.264**	**0.249**	**0.27**
Boron	Y	mg/L	NL	NL	2	< 0.05	< 0.05	< 0.05	< 0.05	**3.54**	**3.56**	**3.44**	**3.22**	**3.76**	**0.39**	**0.46**	**0.45**	**0.43**	**0.46**
Chromium	Y	mg/L	NL	NL	0.1	**0.01**	**0.005**	**0.015**	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cobalt	N	mg/L	NL	NL	1	NM	NM	NM	< 0.005	NM	NM	NM	NM	**0.011**	NM	NM	NM	NM	< 0.005
Iron	Y	mg/L	NL	NL	5	**0.51**	**0.19**	**0.38**	**0.34**	**3.86**	**3.64**	**4.23**	**4.85**	**4.16**	**3.18**	**2.98**	**3.06**	**2.76**	**2.84**
Manganese	Y	mg/L	NL	NL	0.15	**0.039**	**0.02**	**0.054**	**0.037**	**0.231**	**0.218**	**0.23**	**0.24**	**0.22**	**0.028**	**0.024**	**0.024**	**0.029**	**0.026**
Nickel	Y	mg/L	NL	NL	0.1	**0.099**	**0.068**	**0.151**	**0.108**	**0.252**	**0.256**	**0.253**	**0.244**	**0.274**	**0.05**	**0.048**	**0.048**	**0.049**	**0.05**
Zinc	N	mg/L	NL	NL	5	NM	NM	NM	< 0.010	NM	NM	NM	NM	< 0.010	NM	NM	NM	NM	< 0.010
Inorganics - Other																			
Chloride	Y	mg/L	NL	NL	200	**6**	**5**	**9**	**6**	**1110**	**1160**	**1100**	**1100**	**1050**	**201**	**176**	**184**	**163**	**123**
Methane	Y	ug/L	NL	NL	NS	**79.5**	**10.4**	**15.4**	**16.3 N S**	**1510**	**1620**	**999**	**1150**	**1320 N S**	**281**	**228 J**	< 4.0 J	**229**	**443 N S**
Nitrate (as N)	Y	mg/L	NL	NL	10.0	< 0.10 J	< 0.10 J	< 0.10	< 0.10	< 0.10 J	< 0.10 J	< 0.10 J	< 0.10	< 0.10	< 0.10 J	< 0.10 J	< 0.10 J	< 0.10	< 0.10
Sulfate	Y	mg/L	NL	NL	400	< 15	< 15	< 15	< 15 NN	< 15	< 15	< 15	< 15	< 15 NN	**39**	**36**	**39**	**39**	**39 NN**

Notes:
(1) Detections are bold.
(2) No results exceeded the West or North Pathway Action Levels. Shaded cells indicate exceedance of the Illinois Class I Groundwater Standard.
(3) Only detected analytes are presented. Full lists of non-detected analytes are provided in respective quarterly reports.
(4) NM indicates that the parameter was not analyzed for during the specified sampling event.
(5) NL indicates that there is no North or West Pathwary Action Level whereas NS indicates that there is not Illinois Class I Groundwater Standard.
(6) A less than symbol indicates thte analyte was analyzed for, but was not detected above the reported sample quantation limit.
(7) A less than symbol and J indicates that the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.
(8) J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
(9) J+ indicates the analyte was positively identified; the associated numerical value is likely to be higher than the concentration of the analyte in the sample.
(10) J- indicates the analyte was positively identified; the associated numerical value is likely to be lower than the concentration of the analyte in the sample.
(11) N indicates that the analyte is not part of the laboratory's NELAC accreditation or accreditation may not be available for the analyte.
(12) R indicates that analyte analysis was rejected due to laboratory calibration outsite acceptance criteria. Refer to the 4th quarter report for additional details.
(13) S indicates that the analysis was subcontracted to another laboratory

Table 2-2
2018 Long-Term Groundwater Monitoring Analytical Results
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Analyte	Quarterly and Annual Sampling (Y/N)	Units	West Pathway Action Level	North Pathway Action Level	IL Class I GW Standard	MW08S						MW13				MW14			
						3/28/2018	6/20/2018	9/27/2018	9/27/18 DUP	12/17/2018	12/17/18 DUP	3/27/2018	6/21/2018	9/26/2018	12/18/2018	3/28/2018	6/21/2018	9/26/2018	12/18/2018
VOCs																			
1,1-Dichloroethane	N	ug/L	NL	NL	1400	NM	NM	NM	NM	< 5.0	< 5.0	NM	NM	NM	< 5.0	NM	NM	NM	< 5.0
1,2-Dichloropropane	Y	ug/L	850	370	5	**2.5 J+**	**2.2 J+**	< 1.0	< 1.0	**2.3**	**2.3**	< 1.0 R	< 1.0 R	< 1.0	< 1.0	< 1.0 R	< 1.0 R	< 1.0	< 1.0
Benzene	Y	ug/L	6300	1370	5	**2.3**	**1.9**	**2.1**	**2.1**	**2.2**	**2.1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	Y	ug/L	NL	NL	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	Y	ug/L	10580	4770	2	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J
SVOCs																			
1,4-Dioxane	Y	ug/L	NL	NL	7.7	**18**	**16**	**13**	**13**	**20**	**20**	**46**	**21**	< 25	**49**	**4**	< 5	< 5	< 5
Inorganics - Metals																			
Arsenic	Y	mg/L	NL	NL	0.01	**0.077**	**0.078**	**0.074**	**0.076**	**0.076**	**0.072**	**0.03**	**0.013**	**0.024**	**0.037**	**0.022**	**0.027**	**0.008 J**	**0.006 J**
Barium	Y	mg/L	NL	NL	2	**0.422**	**0.425**	**0.42**	**0.416**	**0.438**	**0.42**	**0.244**	**0.141**	**0.208**	**0.23**	**0.062**	**0.085**	**0.036**	**0.046**
Boron	Y	mg/L	NL	NL	2	**0.41**	**0.41**	**0.38**	**0.38**	**0.39**	**0.38**	**0.76**	**0.42**	**0.65**	**0.8**	**0.1**	**0.1**	**0.08**	**0.12**
Chromium	Y	mg/L	NL	NL	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cobalt	N	mg/L	NL	NL	1	NM	NM	NM	NM	< 0.005	< 0.005	NM	NM	NM	< 0.005	NM	NM	NM	< 0.005
Iron	Y	mg/L	NL	NL	5	**6.73**	**6.52**	**6.84**	**6.8**	**7.54**	**7.26**	**6.02**	**2.25**	**3.84**	**6.15**	**9.42**	**8.79**	**1.46**	**1.07**
Manganese	Y	mg/L	NL	NL	0.15	**0.046**	**0.049**	**0.046**	**0.046**	**0.046**	**0.046**	**0.078**	**0.038**	**0.12**	**0.072**	**0.022**	**0.068**	< 0.005	< 0.005
Nickel	Y	mg/L	NL	NL	0.1	**0.048**	**0.046**	**0.051**	**0.051**	**0.055**	**0.054**	**0.08**	**0.042**	**0.071**	**0.078**	**0.01**	**0.01**	**0.006**	**0.018**
Zinc	N	mg/L	NL	NL	5	NM	NM	NM	NM	< 0.010	**0.011**	NM	NM	NM	< 0.010	NM	NM	NM	< 0.010
Inorganics - Other																			
Chloride	Y	mg/L	NL	NL	200	**164**	**163**	**160**	**157**	**171**	**148**	**223**	**111**	**163**	**196**	**22**	**22**	**15**	**42**
Methane	Y	ug/L	NL	NL	NS	**218**	**198**	**610**	**540**	**725 N S**	**605 N S**	**301**	**193**	**410**	**552 N S**	**6.2**	**16.6**	< 4.0	< 4.0 N S
Nitrate (as N)	Y	mg/L	NL	NL	10.0	< 0.10 J	< 0.10 J	< 0.10	< 0.10	< 0.10	< 0.10	**0.29 J**	**3.50 J**	< 0.10	< 0.10	**0.42 J**	**0.22 J**	< 0.10	**0.34**
Sulfate	Y	mg/L	NL	NL	400	**26**	**22**	**17**	**17**	< 15 NN	< 15 NN	**28**	**42**	**18**	**19 NN**	< 15	< 15	< 15	< 15 NN

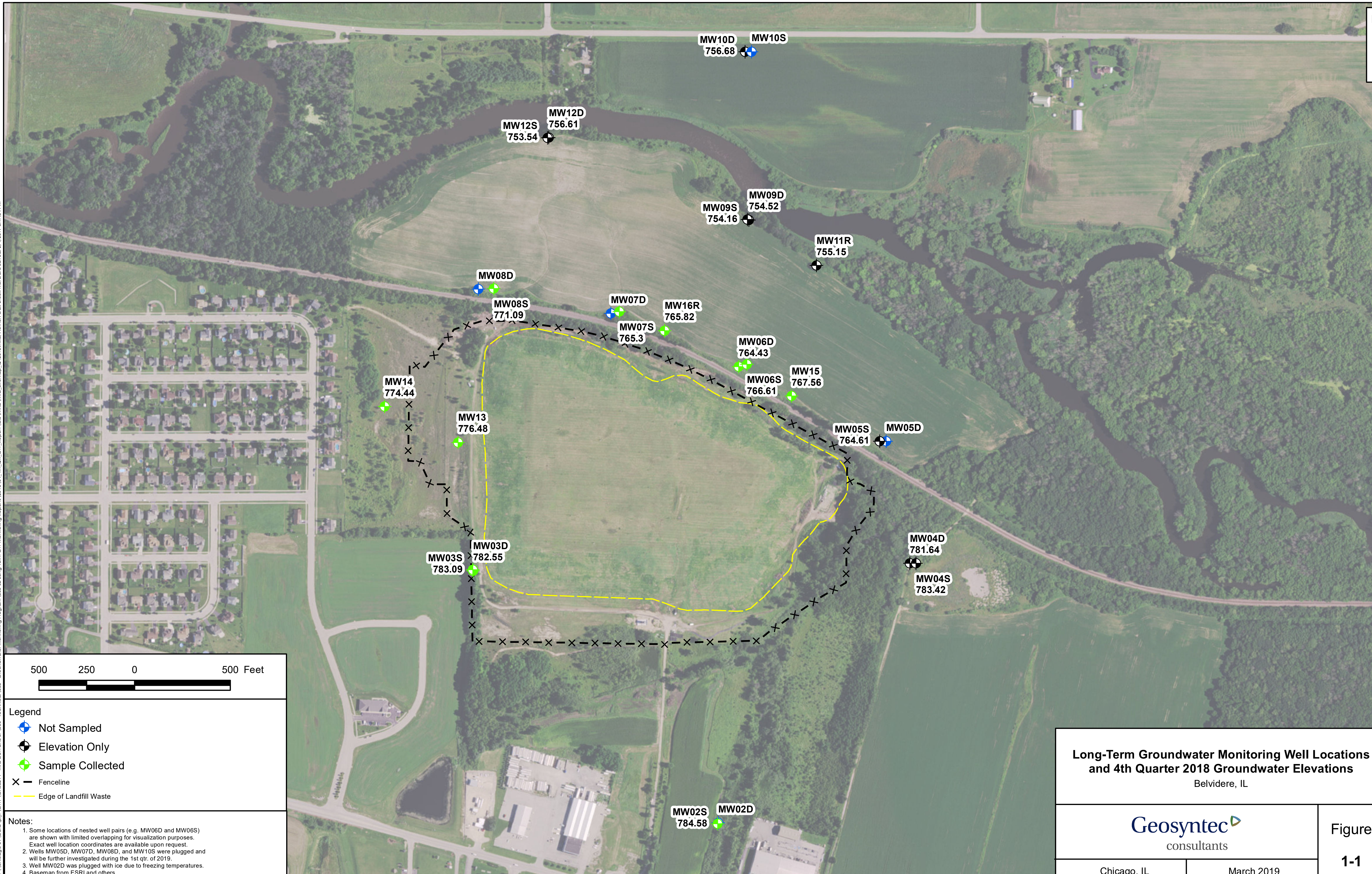
Notes:
(1) Detections are bold.
(2) No results exceeded the West or North Pathway Action Levels. Shaded cells indicate exceedance of the Illinois Class I Groundwater Standard.
(3) Only detected analytes are presented. Full lists of non-detected analytes are provided in respective quarterly reports.
(4) NM indicates that the parameter was not analyzed for during the specified sampling event.
(5) NL indicates that there is no North or West Pathwary Action Level whereas NS indicates that there is not Illinois Class I Groundwater Standard.
(6) A less than symbol indicates thte analyte was analyzed for, but was not detected above the reported sample quantation limit.
(7) A less than symbol and J indicates that the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.
(8) J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
(9) J+ indicates the analyte was positively identified; the associated numerical value is likely to be higher than the concentration of the analyte in the sample.
(10) J- indicates the analyte was positively identified; the associated numerical value is likely to be lower than the concentration of the analyte in the sample.
(11) N indicates that the analyte is not part of the laboratory's NELAC accreditation or accreditation may not be available for the analyte.
(12) R indicates that analyte analysis was rejected due to laboratory calibration outsite acceptance criteria. Refer to the 4th quarter report for additional details.
(13) S indicates that the analysis was subcontracted to another laboratory

Table 3-1
2018 Long-Term Groundwater Monitoring Analytical Results
MIG/DeWane Landfill Superfund Site
Boone County, Belvidere, Illinois

Analyte	Quarterly and Annual Sampling (Y/N)	Units	West Pathway Action Level	North Pathway Action Level	IL Class I GW Standard	MW15				MW16R			
						3/28/2018	6/20/2018	9/27/2018	12/18/2018	3/28/2018	6/20/2018	9/27/2018	12/18/2018
VOCs													
1,1-Dichloroethane	N	ug/L	NL	NL	1400	NM	NM	NM	< 5.0	NM	NM	NM	< 5.0
1,2-Dichloropropane	Y	ug/L	850	370	5	< 1.0 R	< 1.0 R	< 1.0	< 1.0	< 1.0 R	< 1.0 R	< 1.0	< 1.0
Benzene	Y	ug/L	6300	1370	5	**3.4**	**3.2**	**3.1**	**2.6**	**1.5**	**1.2**	**2.1**	**2.1**
Trichloroethene	Y	ug/L	NL	NL	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	Y	ug/L	10580	4770	2	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J	< 1.0 J
SVOCs													
1,4-Dioxane	Y	ug/L	NL	NL	7.7	**90**	**131**	**88**	**119**	**16**	**12**	**5**	**12**
Inorganics - Metals													
Arsenic	Y	mg/L	NL	NL	0.01	**0.029**	**0.03**	**0.034**	**0.034**	**0.014**	**0.024**	**0.024**	**0.02**
Barium	Y	mg/L	NL	NL	2	**0.839**	**0.924**	**0.814**	**0.776**	**0.192**	**0.178**	**0.162**	**0.176**
Boron	Y	mg/L	NL	NL	2	**4.57**	**5.15**	**5.08**	**4.77**	**0.7**	**0.63**	**0.54**	**0.55**
Chromium	Y	mg/L	NL	NL	0.1	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cobalt	N	mg/L	NL	NL	1	NM	NM	NM	**0.014**	NM	NM	NM	< 0.005
Iron	Y	mg/L	NL	NL	5	**15.5**	**16.2**	**13.9**	**12.2**	**15.4**	**17.7**	**19.2**	**25.1**
Manganese	Y	mg/L	NL	NL	0.15	**0.244**	**0.251**	**0.211**	**0.18**	**0.674**	**0.426**	**0.411**	**0.371**
Nickel	Y	mg/L	NL	NL	0.1	**0.334**	**0.372**	**0.363**	**0.332**	**0.073**	**0.059**	**0.041**	**0.054**
Zinc	N	mg/L	NL	NL	5	NM	NM	NM	< 0.010	NM	NM	NM	< 0.010
Inorganics - Other													
Chloride	Y	mg/L	NL	NL	200	**1510**	**1530**	**1310**	**1050**	**397**	**308**	**165**	**219**
Methane	Y	ug/L	NL	NL	NS	**1330**	**1110**	**1250**	**1170 N S**	**682**	**750**	**1160**	**1380 N S**
Nitrate (as N)	Y	mg/L	NL	NL	10.0	**0.23 J**	**0.26 J**	< 0.10	< 0.10	< 0.10 J	< 0.10 J	< 0.10	< 0.10
Sulfate	Y	mg/L	NL	NL	400	< 15	< 15	< 15	< 15 NN	< 15	**16**	< 15	< 15 NN

Notes:
(1) Detections are bold.
(2) No results exceeded the West or North Pathway Action Levels. Shaded cells indicate exceedance of the Illinois Class I Groundwater Standard.
(3) Only detected analytes are presented. Full lists of non-detected analytes are provided in respective quarterly reports.
(4) NM indicates that the parameter was not analyzed for during the specified sampling event.
(5) NL indicates that there is no North or West Pathwary Action Level whereas NS indicates that there is not Illinois Class I Groundwater Standard.
(6) A less than symbol indicates thte analyte was analyzed for, but was not detected above the reported sample quantation limit.
(7) A less than symbol and J indicates that the analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate.
(8) J indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
(9) J+ indicates the analyte was positively identified; the associated numerical value is likely to be higher than the concentration of the analyte in the sample.
(10) J- indicates the analyte was positively identified; the associated numerical value is likely to be lower than the concentration of the analyte in the sample.
(11) N indicates that the analyte is not part of the laboratory's NELAC accreditation or accreditation may not be available for the analyte.
(12) R indicates that analyte analysis was rejected due to laboratory calibration outsite acceptance criteria. Refer to the 4th quarter report for additional details.
(13) S indicates that the analysis was subcontracted to another laboratory

FIGURES



500 250 0 500 Feet

Legend
- Not Sampled
- Elevation Only
- Sample Collected
- Fenceline
- Edge of Landfill Waste

Notes:
1. Some locations of nested well pairs (e.g. MW06D and MW06S) are shown with limited overlapping for visualization purposes. Exact well location coordinates are available upon request.
2. Wells MW05D, MW07D, MW08D, and MW10S were plugged and will be further investigated during the 1st qtr. of 2019.
3. Well MW02D was plugged with ice due to freezing temperatures.
4. Basemap from ESRI and others.

Long-Term Groundwater Monitoring Well Locations and 4th Quarter 2018 Groundwater Elevations

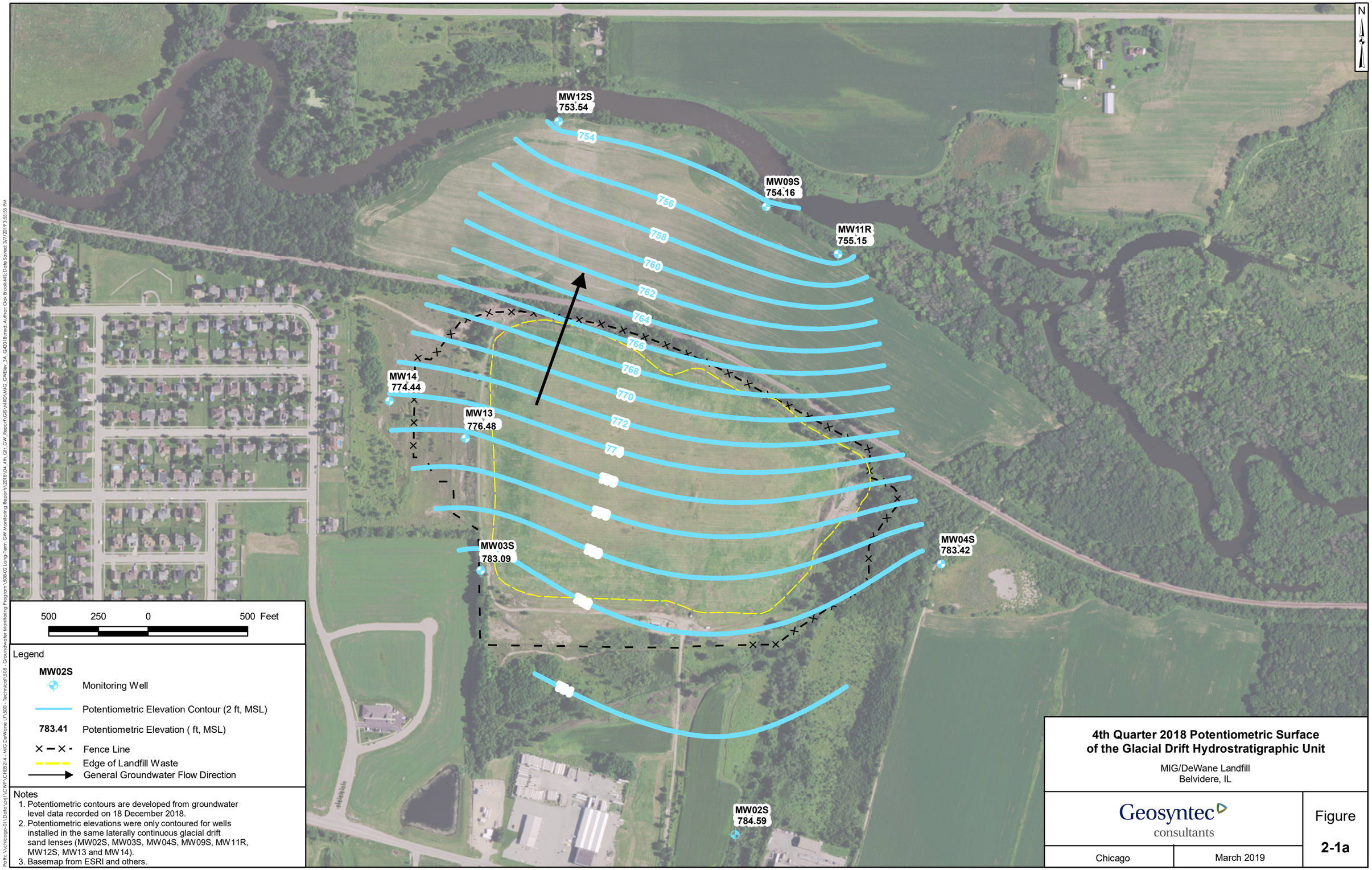
Belvidere, IL

Geosyntec consultants

Chicago, IL | March 2019

Figure 1-1

Path: \\chicago-01\Data\prj1\CWP\CHE8214 - MIG DeWane LF\500 - Technical\508 - Groundwater Monitoring Program\508-02 Long-Term GW Monitoring Reports\2018\04_4th_Qtr_GW_Report\GIS\MXD\MIG_SiteMap_Q42018.mxd; Author: Oak Brook-MS; Date Saved: 2/4/2019 5:17:54 PM



4th Quarter 2018 Potentiometric Surface of the Glacial Drift Hydrostratigraphic Unit

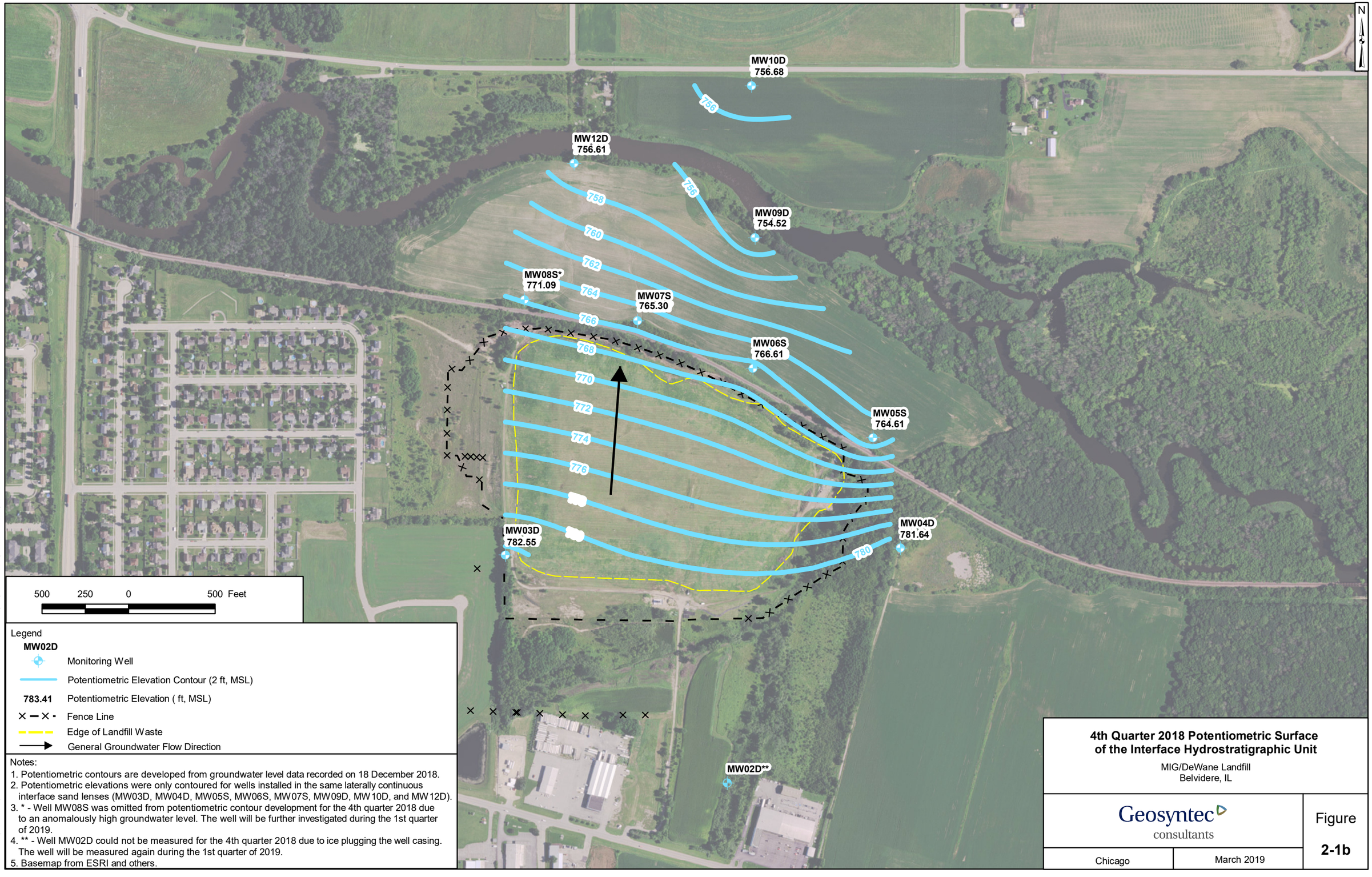
MIG/DeWane Landfill
Belvidere, IL

Geosyntec consultants

Chicago | March 2019

Figure **2-1a**

Path: \\chicago-fil\Data\proj\CWP\CH8214 - MIG DeWane LF\300 - Technical\308 - Groundwater Monitoring Program\308-02 Long-Term GW Monitoring Report\GIS\MXD\MIG_GWElev_3A_Q42018.mxd; Author: Dak Brook-MS; Date Saved: 3/7/2019 3:55:55 PM



Notes:
1. Potentiometric contours are developed from groundwater level data recorded on 18 December 2018.
2. Potentiometric elevations were only contoured for wells installed in the same laterally continuous interface sand lenses (MW03D, MW04D, MW05S, MW06S, MW07S, MW09D, MW10D, and MW12D).
3. * - Well MW08S was omitted from potentiometric contour development for the 4th quarter 2018 due to an anomalously high groundwater level. The well will be further investigated during the 1st quarter of 2019.
4. ** - Well MW02D could not be measured for the 4th quarter 2018 due to ice plugging the well casing. The well will be measured again during the 1st quarter of 2019.
5. Basemap from ESRI and others.

4th Quarter 2018 Potentiometric Surface of the Interface Hydrostratigraphic Unit

MIG/DeWane Landfill
Belvidere, IL

Geosyntec consultants

Chicago | March 2019

Figure **2-1b**